NAVAL SIMULATION SYSTEM (NSS)

JFACC Tool

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NSS JFACC TOOL -
Outline

- NSS overview
- Brief review of the JFACC planning process and insertion points for NSS tool
- Phase II NSS/TMS support - JIPTL building
  - TMS support to JFACC planners
  - TMS products produced for NSS simulation in Phase III
- Phase III NSS support - MAAP building
  - MAAP IP optimization algorithm input windows
  - viewing MAAP IP optimization results
  - preparing candidate MAAP for detailed NSS simulation
- Phase IV NSS support - ATO building
- NSS JFACC Tool in Joint Task Force Exercise (JTFEX) 98-1
- Future work

NSS JFACC TOOL -
NSS Overview - 1

- Naval Simulation System (NSS) development was initiated in FY95 by SPAWAR PD-31 under CNO N81 and N62 resource sponsorship.
- Starting in FY98, NSS is funded by CNO N62. SPAWAR PMW-131-1 is the Program Manager.
- DMSO has funded NSS High Level Architecture (HLA) compliance and federation / experimentation activities.
- HPCMO/CHSSI is funding a parallel, high performance computer extension to NSS to support real-time strike plan evaluation.

NSS JFACC TOOL -
NSS Overview - 2

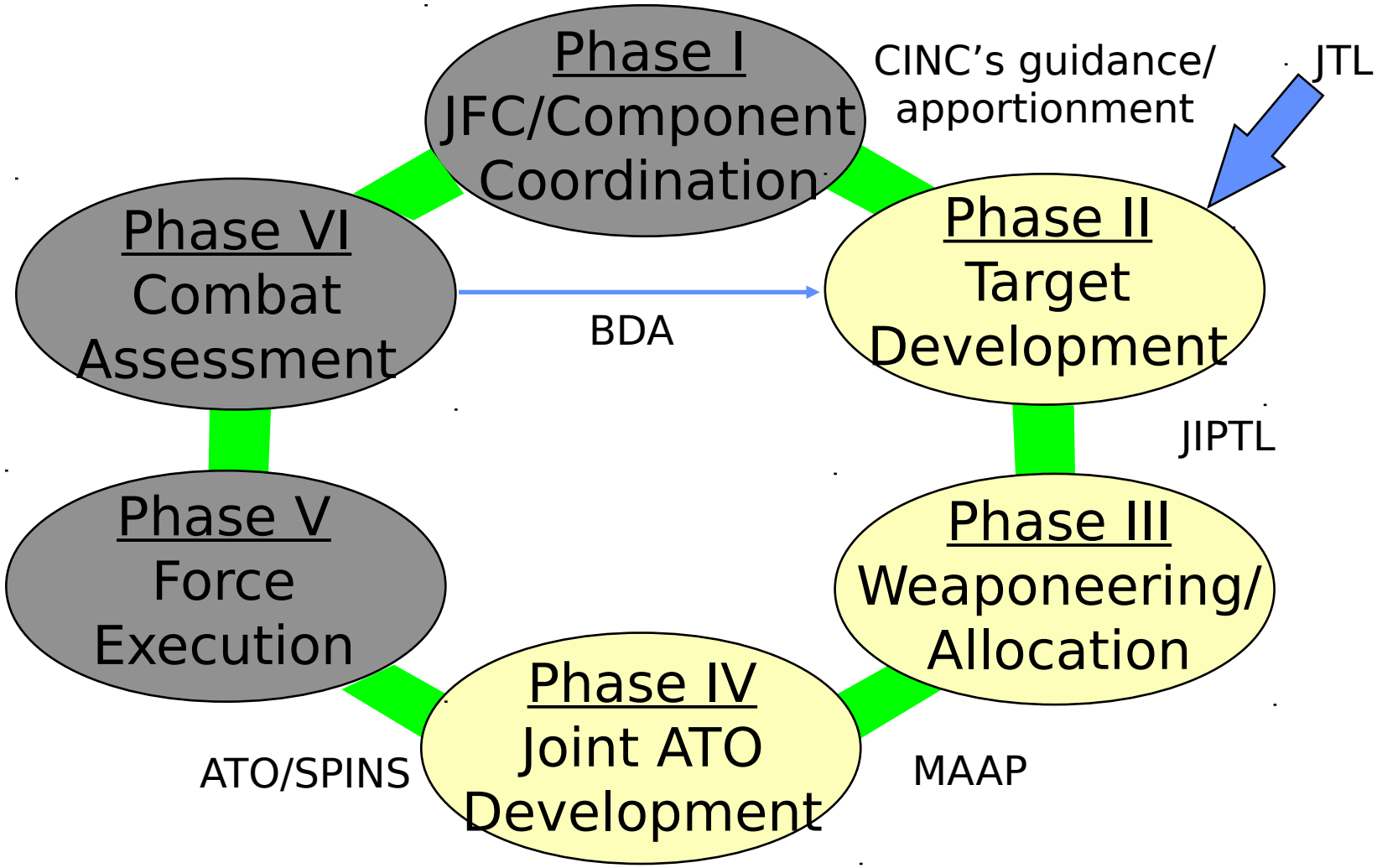
- **Support Analyst Users**
  - System Concept Development and Evaluation
  - Joint Mission Area (JMA) Assessments, Investment Balance Review (IBR)
  - *USERS:* Joint Staff, OPNAV, SYSCOMs, R&D Centers, etc.
- **Support Fleet Experiments**
  - Experiment Planning, Pre-Play, and Post-Analysis
  - Virtual Scenario Augmentation Using HLA Interfaces to Other Simulations and Operational C2 Systems
  - *USERS:* Fleet Battle Experiment (FBE) Series
- **Support Fleet Operational Users**
  - Course of Action (COA) Development and Evaluation
  - Execution Plan Development and Evaluation
  - Specific JMCIS Segments Supporting Operational Planning
  - *USERS:* CJTF, JFACC, Numbered Fleet Commands, etc.

NSS JFACC TOOL -
NSS Overview - 3

- Object-Oriented (C++)
- Monte Carlo (with distributed processing option)
- Multi-Resolution
- Entity Level
  - Platforms/Facilities
  - Sensors
  - Weapon
  - Countermeasures
- 3D Motion on a Spherical Earth
- HLA Certified (Dec 97)
- Employs Pre/Post Preprocessors
  - Weaponeering
  - Satellite Orbit Analysis
  - Statistical Analysis and Graphs
- OPLAN Parsing Tools
  - CTAPS/TMS for ATOs
- Explicit C4ISR Treatment:
  - Command Structure
  - OPLANs and Tactics
  - Data Fusion (Basis of Perception)
  - Communications

JMCIS ‘98 Compliance FY98

NSS JFACC TOOL -
Overview of the JFACC Planning Cycle



NSS JFACC TOOL -
Phase II

- The Targeting Management System (TMS), an NSS pre-processor, is used in Phase II to:
  - Read the Joint Target List (JTL).
  - Query the JTL for targets with category codes fulfilling the JFC's guidance and objectives.
    - Currently a manual query. Intention is to implement Metron's suggested mapping of JFC's objectives to cat codes at a later time.
  - Rearrange list of targets to prioritize them into a draft JIPTL.
    - Currently a manual process. Intention is to implement Metron's suggested prioritization algorithm at a later time.
  - Weaponeer the finalized JIPTL to produce a comprehensive list of SCLs and SSPDs for each JIPTL target.
    - required input for NSS MAAP optimization and MAAP simulation in Phase III.
  - Query the JTL database for a set of threats for NSS simulation in Phase III.
    - weaponeer these threats for SCLs and SSPD solutions for NSS.

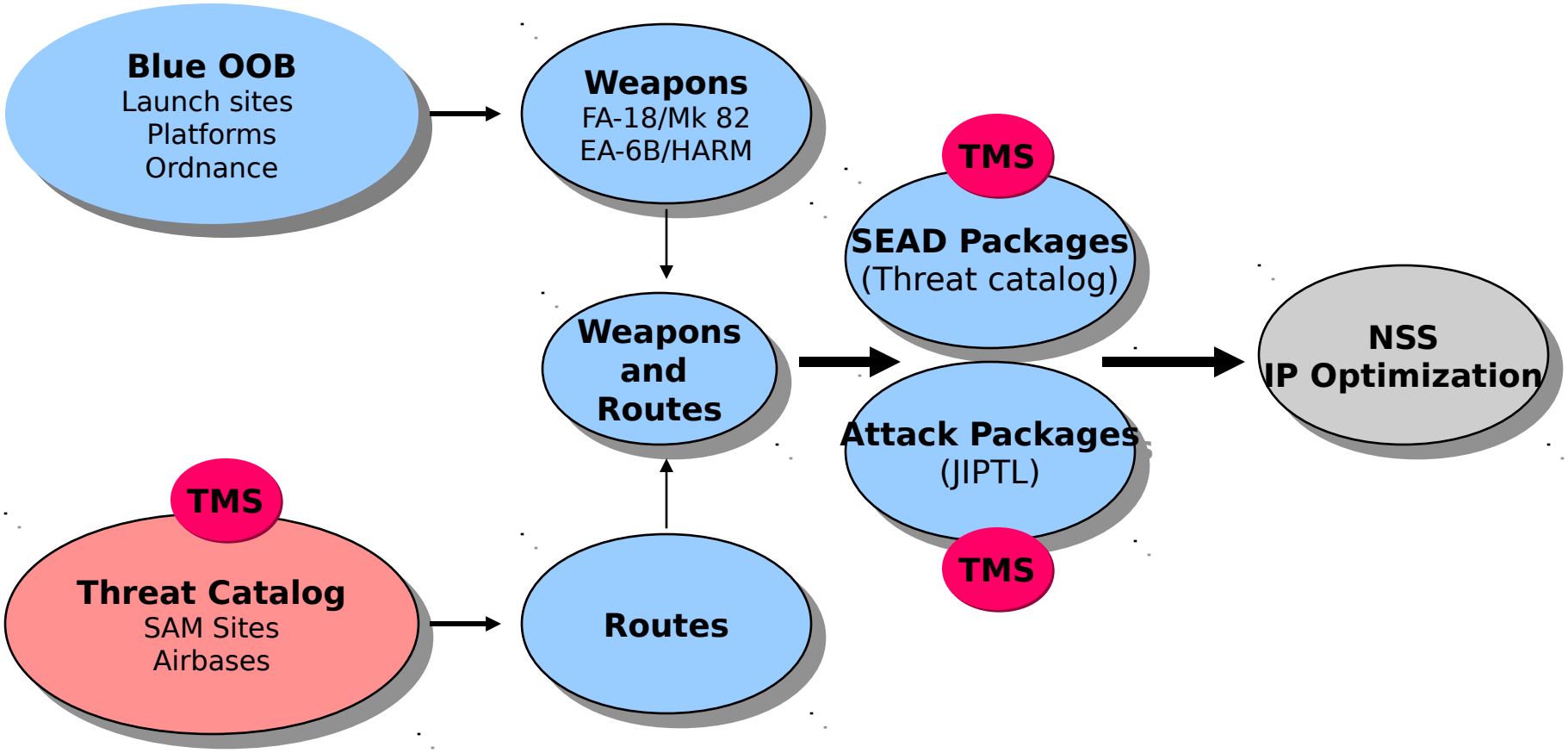
NSS JFACC TOOL -
Phase III

- The NSS JFACC Tool supports Phase III Master Air Attack Plan (MAAP) development by allowing the user to:
  - Build and edit input files for the NSS MAAP IP optimization algorithm;
  - Execute the algorithm and view results from the NSS MAAP IP optimization;
  - modify the candidate MAAP and re-evaluate it in the NSS IP optimization for feasibility;
  - Format results from the IP optimization for the brief to the JFACC;
  - Build and edit input files for NSS detailed simulation of a candidate MAAP;
  - Execute the detailed NSS simulation.

NSS JFACC TOOL -
Mixed Integer Program (MIP) Description

- Objective of MIP optimization is to produce a recommended strike plan that achieves required levels of damage against a set of defended targets while minimizing the cost to friendly forces.
  - Conceptually similar to manual MAAP construction.
- The MIP takes targets, threats, routes, weapons and package options as inputs.
- Outputs from the IP algorithm include optimized routes/package assignments to targets, suppression plan.
- Interface is designed to minimize user involvement in defining these complex inputs.

NSS JFACC TOOL -
MIP Optimization - Overall Process



NSS JFACC TOOL -
Summary of NSS MAAP Optimization Results

- MIP Optimization algorithm produces global MAAP summary with specifics on sorties, DMPIs struck, cruise missiles, cost, and expected losses.
- NSS interface windows allow user to view a summary of each package, what threats engaged it and what suppression packages were assigned.
- User can edit package assignments, routes, etc. and save the revised plan under a new name.
- MAAP can be exported to Excel.
- When finalized, MAAP can be re-imported into TMS, and exported to CTAPS.

NSS JFACC TOOL -
NSS Detailed Simulation of MAAP - 1

- NSS simulation provides a higher-resolution simulation of the plan with more fidelity and greater detail than the IP optimization algorithm.
- Results from NSS simulation of the MAAP can be used as
  - BDA predictions for JFACC planners working on the next day's plan;
  - assessment of own-force attrition;
  - Input to the Phase II JIPTL-building process.

NSS JFACC TOOL -
NSS Detailed Simulation of MAAP - 2

- NSS interface takes optimization results (targets, packages, weapons, SSPDs, SEAD plan, routes, and TOTs) and merges this information with NSS prepared scenario file to form an NSS simulation file.
- User is NOT allowed to change threat ranges, Pks, locations, and package SSPDs against targets, as this information would invalidate the MIP optimization.
- NSS detailed MAAP simulation can be run in parallel with additional NSS MAAP MIP optimizations.

NSS JFACC TOOL -
Phase IV

- The NSS Fleet Application supports ATO development in Phase IV by allowing the user to electronically pass the final MAAP to CTAPS.
- Requirements collection process identified this step as a major improvement to how Maritime JFACC staffs currently conduct business.
- Transfer of basic information from NSS to CTAPS is relatively straightforward.
  - JIPTL, type and number of attacking platforms, ordnance and TOT can be passed via CIDB data tables.
- Transfer of more detailed information must be manually entered via APS.
  - Package details, sortie source, routes, fuel constraints

NSS FLEET JFACC TOOL -
JTFEX 98-1 Results

- Embarked Analysis Team Tasks
  - JTL refinement
  - JIPTL construction in accordance with CJTF guidance
  - DMPI construction
  - MAAP building
  - Passing MAAP to CTAPS
  - Tradeoff study- TACAIR and TLAM
- Successes
  - Near-complete integration into JFACC planning process
  - “BZ” from CJTF (C3F, VADM Browne)
  - Potential future work with JTF-SWA

NSS FLEET JFACC TOOL -
Future Work

- Naval Postgraduate School Review
  - TMS and NSS JFACC Tool installed at Naval Postgraduate School, Monterey CA, mid-May 98
  - Review is ongoing
- C2IP Proposal
  - CPF Command and Control Initiative Program (C2IP) designed to support CPF and subordinate commands with tools that support “emergent need”
  - bypasses traditional procurement procedure
  - submitted to CPF for use at JTF-SWA (Riyadh)